UNITED STATES PROVISIONAL PATENT APPLICATION

Title: Improved Dumbbell

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CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority from provisional application serial no. 60/446,285 which was filed on February 11, 2003, which is hereby incorporated by reference.

TITLE: IMPROVED FIXED DUMBBELL

FIELD OF THE INVENTION

The invention relates generally to dumbbells.

BACKGROUND OF THE INVENTION

Dumbbells are commonly used by body builders and health enthusiasts as an exercise aid and are commonly found in health clubs. There are two principle dumbbell designs found commercially. The first type of dumbbell (the hexagonal dumbbell) utilizes two hexagonal caps which are cast around a knurled handle of steel. The second dumbbell design utilizes repeatable cast iron (or steel) plates mounted to both ends of a steel (or some other alloy) bar possessing small diameter shoulders. The plates abut the shoulders of the bar and are typically mounted to the shoulders by means of threaded fasteners.

Both of the above dumbbell designs suffer from several problems. Firstly, the hexagonal dumbbells tend to come loose fairly easily from the handles around which they are cast. This often happens if the dumbbell is repeatedly dropped. Once loose, the assembly can only be repaired by welding the handles back onto the caps, which draws carbon from the metal rendering the joint brittle and making it prone to breakage through shock loading.

The second dumbbell design is plagued by a single problem: the plates, through typical abuse, come loose on the handle. A few reasons exist for this occurrence, namely:

- The retaining bolt/washer pushing the plates against the handle shoulder come loose.
- The retaining bolt/washer assembly wears through normal usage/abuse. Looseness then develops and is accelerated.
- The plate adjacent to the retaining washer and the plate adjacent to the handle shoulder wear and looseness then develops;
- The typically small diameter dumbbell handle shoulder wears and looseness develops.
- The plates will shift with respect to each other on the handle and act to either (a) turn out the threaded fastener, or (b) rotate relative to one another such that they "seek" a composite dimensional length shorter than when they were originally tightened in place at the factory. This occurs because the individual plate surfaces comprising the cap are not cast/machined parallel.

Manufacturers have attempted to circumvent some of these problems by turning the handle into a bolt by threading each end and screwing the ends into the center of each solid cap. These assemblies, if not machined accurately, will un-thread and loosen. This approach also leads to a dumbbell which is prone to bending and/or breaking at the handle/cap interface. The present invention overcomes these drawbacks by providing an improved dumbbell construction with a more robust joint between the handle and the cap.

SUMMARY OF THE INVENTION

The present invention overcomes the limitations of the prior art by providing a dumbbell having an handle positioned between two weights. The handle has an elongated central portion with opposite first and second ends. First and second flanges are formed on the first and second ends of the central portion, respectively. First and second weights are attached to the first and second flanges, respectively. The first weight has a recess which is dimensioned and configured to receive the first flange. Likewise, the second weight has a recess which is dimensioned and configured to receive the second flange. Each flange has a peripheral edge and is attached to its respective weight by a plurality of bolts positioned adjacent the peripheral edge.

DESCRIPTION OF THE DRAWINGS

FIGURE 1. is a perspective view of the invention.

FIGURE 2. is a side view of the handle portion of the present invention.

FIGURE 3. is a side view of one end cap of the present invention.

FIGURE 4. is a cross sectional view of the end cap shown in figure 3 drawn through line A-A.

FIGURE 5. is a front view of the handle portion of the present invention.

FIGURE 6. is a perspective view of an alternate embodiment of the present invention.

FIGURE 7. is a perspective view of the handle portion of the embodiment shown in figure 6.

FIGURE 8. is a perspective view of one end cap of the embodiment shown in figure 6.

In the drawings, like characters of reference indicate corresponding parts in the different figures.

DETAILED DESCRIPTION OF THE INVENTION

Referring firstly to figures 1, 2 and 3, a dumbbell made in accordance with the present invention, shown generally as item 10, consists of an elongated handle portion 12 having flanges 14 on each end which are mounted to end caps (weights) 16 by bolts 18. Handle portion 12 has a cylindrical portion 20 which is dimensioned to permit a user to grasp. Cylindrical portion 20 has a longitudinal axis 21 and a knurled surface to maximize the users grip on the handle. Flanges 14 are formed on the opposite ends of cylindrical portion 20. Preferably, handle portion 12 is formed from a continuous piece of machined or cast steel (or iron). Radius 22 where the cylindrical portion flares out to form flange 14 is preferably curved, thereby greatly reducing the stress concentrations at the handle/flange interface. Flanges 14 preferably extend perpendicularly from cylindrical portion 20. Flanges 14 each have flat outer surface 24, a peripheral edge 29 an external radiused edge 26, and internal chamfered edge 28, and rim 30 formed between the radiused and chamfered edges. In the diagrams, the dimension of chamfered edge 28 has been exaggerated in order to more clearly show this feature. In a working dumbbell, chamfered edge 28 would be specified as 1/16th of an inch wide by 45^0, while rim 30 would be about 3/8ths of an inch wide. Flanges 14 have several holes 33 positioned along peripheral edge 29 which are configured to receive bolts 18. Rim 30 is preferably perpendicular to outer surface 24 and parallel to axis 21.

End caps (weights) 16 are preferably cylindrical and have longitudinal axis 32, inner face 34 and opposite outer face 36. A recess (counterbore) 38 is formed in inner face 34 and is defined by internal rim 40 and back wall 42. Tapped holes 44 are formed through back wall 42 and are dimensioned to receive and retain the ends of bolts 18. Recess 38 and cap 16 are

coaxially aligned. Internal rim 40 is preferably perpendicular to back wall 42 and parallel to axis 32.

Recess 38 of cap 16 and flanges 14 of handle 12 are dimensioned and configured such that the flanges fit tightly within the recesses. Preferably, the inside diameter of recess 38 between rim 40 is dimensioned to be slightly greater than the outside diameter of flanges 14 such that when inserted into the cavity, the radial shear on bolts 18 induced by shearing movement of back wall 42 across flange surface 24 is minimized. Relief 43 is formed peripherally around back wall 42 to permit outside face 24 to make close contact (seat) with back wall 42. Flange 14 is positioned within recess 38 of cap 16 such that holes 33 on the flange align with tapped holes 44 in the cap, permitting bolts 18 to pass through holes 33 and thread into tapped holes 44. When the flanges are inserted into the cap, the handle portion and the caps are coaxially aligned.

Referring now to figure 5, holes 33 are formed in flange 14 along peripheral edge 29 and adjacent rim 30. Preferably, holes 33 should be formed as close as possible to rim 30 in order to maximize the distance between the holes and longitudinal axis 21.

The present invention has many advantages over the prior art. Threaded fasteners are substantially stronger in tension than in shear. The present design minimizes the shear loading on threaded fasteners 18. When flanges 14 are inserted in recess 38 of end caps 16, rim 30 of the flange and inner rim 40 of the cap are in near physical contact, permitting the end cap and the handle portion to efficiently transmit shear forces between rim 30 and inner rim 40 should the dumbbell be dropped. As a result, less shear force is applied to fasteners 18 and the fasteners are less likely to loosen or fail. Also, by mounting flange 14 to cap 16 by fasteners positioned as close to rim 30 and as far away from longitudinal axis 21, the moment arm is lengthened and the

mechanical advantage provided to the fasteners is maximized. As the distance between fasteners 18 and longitudinal axis 21 is increased, the tensile loads experienced by a given sized faster is reduced when the dumbbell is dropped. Thus, the fasteners are less likely to loosen or fail and the dumbbell is capable of enduring repeated abuse. The present design also has the advantage of ease of construction, since the weight of the dumbbell can be altered simply by changing the size and therefore, the weight of end caps 16.

As can be seen in figure 6, it is not necessary for the flanges or the caps to be "circular". Indeed, the flanges may be hexagonal, square, star shaped or any other shape. If the flanges are in the shape of a polygon such as a hexagon or a square, then the dumbbell may be made more resistant to damage as a result of an accidental drop. In the embodiment shown in figure 6, dumbbell 100 is constructed using hexagonal caps 110. Dumbbell 100 has cylindrical portion 102 having flanges 104 formed on its opposite ends. Flanges 104 are hexagonal and have rim 106 along its peripheral edge and flat outer faces (surfaces) 108. Caps 110 have hexagonal recesses 112 which have internal rim 114 and flat wall 116. Hexagonal recess 112 is dimensioned and configured to receive flange 104 such that outer faces 108 abuts wall 116 and rim 106 closely abuts inner rim 114. Flanges 104 are bolted to caps 110 by bolts 120 which pass through apertures 122 in the flanges and into tapped holes 124 in the caps, as in the previous embodiment. In this embodiment, the hexagonal flanges in combination with the hexagonal recesses prevent the flanges from rotating should the dumbbell be accidentally dropped. The hexagonal flanges resist rotation of the cap 110 relative to the handle flange 104, minimizing rotational shear on the bolts 120, thereby making the dumbbell stronger. Furthermore, the present design permits the user to replace the handle portion on the dumbbells should the handle

portion be damaged.

Specific embodiments of the present invention have been disclosed; however, several variations of the disclosed embodiment could be envisioned as within the scope of this invention. It is to be understood that the present invention is not limited to the embodiments described above, but encompasses any and all embodiments within the scope of the following claims.